2/16/2022

From last class

Ex Subtract the rational expressions

$$\frac{3}{2x^2+x} - \frac{2x}{6x+3}$$

These are unlike denominators
so we should find the
LCD (least common denominator)

1) Factor the denominators:

$2x^2+x$: $x(2x+1)$

$6x+3$: $3(2x+1)$

2) Create the LCD:

$3x(2x+1)$

Note: For the LCD use all the distinct factor with their highest power.

3) Rewrite the rational expressions:

$$\frac{3}{2x^2+x} = \frac{3}{x(2x+1)} \overset{\times 3}{\underset{\times 3}{}} = \frac{9}{3x(2x+1)}$$

↑ original   ↑ LCD

$$\frac{2x}{6x+3} = \frac{2x}{3(2x+1)} \overset{\times x}{\underset{\times x}{}} = \frac{2x^2}{3x(2x+1)}$$

↑ original   LCD

3) Subtract $\dfrac{9}{3x(2x+1)} - \dfrac{2x^2}{3x(2x+1)}$

$$= \boxed{\frac{9-2x^2}{3x(2x+1)}}$$

Cannot simplify further
so leave it!

Beware - the canceling!

$$\frac{\cancel{3}^1 + 1}{\cancel{9}_3} = \frac{1+1}{3} = \frac{2}{3}$$

$$\frac{3+1}{9} = \frac{4}{9} \quad \nearrow$$

Complex Fractions:

Ex $\quad \dfrac{\frac{2}{3}}{\frac{4}{5}}$

A complex fraction has fractions as numerator and/or denominator

There are 2 methods for tackling this simplification

Method 1 : $\dfrac{\frac{2}{3}}{4/5} = \dfrac{2}{3} \times \dfrac{5}{4_2} = \dfrac{5}{6}$

"Keep change FLIP!"

Method 2 : Find the LCD of
the denominators and
multiply top + bottom
by it

$\dfrac{2/3}{4/5}$ Find the LCD of 3 & 5

LCD = 15

Now use it! $\dfrac{\left(\frac{2}{3_1}\right) \cdot \frac{\cancel{15}^{5}}{1}}{\left(\frac{4}{5}\right) \cdot \frac{\cancel{15}^{3}}{1}} = \dfrac{10}{12}$

$= \dfrac{5}{6}$

Challenge :
Simplify $\dfrac{\left(\frac{x+y}{y}\right) \cdot \frac{y}{1}}{\left(\frac{x}{y}+2\right) \cdot \frac{y}{1}}$

$$\frac{\left(\frac{x+1}{y}\right)^{\cancel{y}}}{\cancel{x}\left(\frac{x}{\cancel{y}}\right)+(2)^y} = \frac{x+1}{x+2y}$$

$\xi \sim \boxed{oo} = 3$

$\xi = \ddot{\bigodot} \dddot{w}$

Beware!
Don't
cancel
the x!

$$\frac{\cancel{5}+1}{\cancel{5}+16}$$

Now we can solve Rational Equations

EX
solve $\dfrac{x}{2} + \dfrac{8}{3} = \dfrac{1}{6}$

Method 1 $\longrightarrow$ Make all denominators the same

LCD : $\begin{matrix}2\\3\end{matrix}$ ① LCD: 6

$6 = 2 \cdot 3$

② Rewrite all fractions so they have denominator 6

$$\frac{x}{2} \stackrel{\times 3}{\underset{\times 3}{=}} \frac{3x}{6}$$

$$\frac{8}{3} \stackrel{\times 2}{\underset{\times 2}{=}} \frac{16}{6}$$

$$\frac{1}{6} = \frac{1}{6}$$

③ $\frac{3x}{6} + \frac{16}{6} = \frac{1}{6}$

$$\frac{3x+16}{6} = \frac{1}{6}$$

$$6(3x+16) = 1 \cdot 6$$

$$3x + 16 = 1$$
$$-16 \quad -16$$

$$\frac{3x}{3} = \frac{-15}{3}$$

$$\boxed{x = -5}$$

Check: $\frac{x}{2} + \frac{8}{3} = \frac{1}{6}$

$$\frac{-5}{2} + \frac{8}{3} \stackrel{2}{=} \frac{1}{6} \implies \frac{-15}{6} + \frac{16}{6} \stackrel{\checkmark}{=} \frac{1}{6}$$

To solve rational equations (Fractional):

① Find the LCD of all denominators.

② Multiply both sides by LCD.

③ Solve